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ARISTEYERA, A NEW GENUS OF GEONOMOID PALMS¹

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THE GEONOMEAE CONSTITUTE A DISTINCTIVE TRIBE of monoecious arecoid palms (Palmae-Arecoideae) restricted to the Western Hemisphere. The most recent treatments of Burret (1930) and Burret and Potztal (1956) recognize seven genera — *Asterogyne*, *Calyptrogyne*, *Geonoma*, *Kalbreycera*, *Pholidostachys*, *Taenianthera*, and *Welfia* — to which *Calyptronoma* may be added as a genus distinct from *Calyptrogyne* as noted by Bailey (1938). Material recently received from Venezuela provides the basis for recognition of still another genus described herein as *Aristeyera*. The generic name is coined from the surnames of Lic. Leandro Aristeguieta and Dr. Julian A. Steyermark of the Instituto Botánico at Caracas, who have most kindly loaned or given specimens and provided preserved materials of flowers and fruits for anatomical study. This fine material has provided the writer and Doctors Uhl and Tomlinson, whose articles accompany this one, an opportunity to present a standard morphological description in concert with anatomical studies.²

The Geonomeae are marked by some 12 characteristics common to all the component genera. The generic distinctions, however, are found chiefly in the androecium, in the number of locules and ovules in the pistil at anthesis, in the fibers of the mesocarp of the fruit, in the arrangement of floral pits on the flowering axis or axes, and to some extent in the structure of the inflorescence. The synoptic key that follows is intended to suggest the combinations of characteristics that separate genera and the relative levels of their specialization. *Geonoma* is the largest, most widely distributed, and, so far as the unilocular, uniovulate pistil is concerned, the most advanced genus in the tribe. Burret (1930) recognized 172 species in the genus plus a few not well known, and some 26 species have been described since. If *Taenianthera* is to be included within the genus, as

¹ This study has been supported in part by National Science Foundation Grant GB-1354.

² UHL, N. W. Morphology and anatomy of the inflorescence axis and flowers of a new palm, *Aristeyera spicata*. Jour. Arnold Arb. 47: 9-22. 1966.

TOMLINSON, P. B. Notes on the vegetative anatomy of *Aristeyera spicata* (Palmae). Jour. Arnold Arb. 47: 23-29. 3 pls. 1966.

seems reasonable, then the number of recognized species slightly exceeds 200. The remaining genera are small or monotypic and are characterized, so far as known, by a trilocular, triovulate pistil in combination with various modifications of the androecium and inflorescence.

Although the tribe is being studied morphologically and anatomically as part of a program to produce a broadly based revision of the Palmae at the generic level, it seems desirable to describe *Aristeyera* separately and to put on record now some observations on the complex anatomy of the inflorescence axis as well as certain features of floral morphology and anatomy, and vegetative anatomy. The genus is of especial interest because of the structure of the anthers which parallels that of anthers in *Asterogyne*, *Geonoma*, and *Kalbreycera*, though in other respects the staminate and pistillate flowers are basically similar to those of *Welfia* with which it seems most clearly allied.

KEY TO GENERA OF GEONOMEAE

1. Staminate flowers with numerous stamens (21–42); pistillate flowers with numerous staminodes (15–18); pistil trilocular, triovulate at anthesis; mesocarp with a layer of closely placed slender fibers surrounding the endocarp; bracts subtending the inflorescence inserted basally; floral pits arranged in vertical series on the inflorescence axes.
2. Anthers erect in bud, sagittate, the thecae united laterally with the connective; inflorescence of several massive unbranched axes from a short dorso-ventrally compressed decurved peduncle and very short rachis, subtended by massive broad woody bracts; seed with the raphe sparingly branched basally and apically; large palms with stout stems and long pinnate leaves; leaf with 2-layered colorless hypodermis abaxially and adaxially. *Welfia*.
2. Anthers inflexed in bud, the thecae separate and terminal on arms of a bifid connective; inflorescence spicate, erect, long-pedunculate, subtended by thin narrow bracts; seed with raphe unbranched, furcate, or of few parallel branches; small palms with elongate-cuneate pinnately nerved leaves divided only at the bifid apex or if irregularly divided laterally then the bases of the segments continuous along the rachis; leaf with colorless hypodermis 1-layered abaxially, absent adaxially. . . *Aristeyera*.
1. Staminate flowers with 6 or rarely 3 stamens; pistillate flowers with staminodes united in a truncate, 6-crenulate or -toothed or prominently 6-lobed tube; pistil trilocular or unilocular at anthesis; fibers of the mesocarp various; insertion of bracts and arrangement of floral pits various.
3. Anthers erect in bud, sagittate, the thecae united laterally with the connective; pistil trilocular, triovulate at anthesis with terminal styles loosely united; fruit with few stout curved or anastomosing fibers in the mesocarp; floral pits arranged in vertical series; inflorescence and insertion of bracts various.
4. Upper bract of the inflorescence inserted at the base of the peduncle or somewhat above the base, never at the base of the flowering axis or axes.
5. Inflorescence once- or twice-branched; bracts subtending the floral pits with margins not overlapping adjacent bracts; staminodia of

- pistillate flowers united in a solid receptacle below the spreading lobes; fruit with wrinkled exocarp when dry but the fibers of the mesocarp not clearly outlined. *Calyptronoma*.
5. Inflorescence spicate; bracts subtending the floral pits with margins overlapping the bases of adjacent bracts; staminodia united in a hollow tube below the spreading lobes; fruit with fibers of the mesocarp prominently outlined when dry. *Pholidostachys*.
4. Upper bract of the inflorescence terete, inserted at the base of and enclosing the spicate flowering axis in bud, caducous at anthesis, leaving a ring-like scar at apex of the long peduncle, the lower bract inserted at the base of the peduncle. *Calyptrogyne*.
3. Anthers inflexed in bud, the thecae separate and terminal on arms of a bifid connective; pistil various; fruit with numerous thin mostly unbranched closely placed longitudinal fibers surrounding the endocarp (unknown in *Kalbrejera*); bracts subtending the spicate to paniculately branched inflorescence inserted near or at the base, never at the base of the flowering axis; floral pits variously arranged.
6. Pistil trilocular, triovulate at anthesis with elongate terminal styles loosely united (*Kalbrejera*?); floral pits arranged in more or less clearly defined vertical rows.
7. Stamens 6; pistillode nearly as long as the stamens; staminodial tube with 6 spreading lobes; floral pits in 7 vertical rows; inflorescence long-pedunculate with 2-7 subfasciculate flowering axes. *Asterogyne*.
7. Stamens 3; pistillode short, trifid; staminodial tube truncate; floral pits in 4 vertical rows and nearly decussate; inflorescence short-pedunculate, terminating in a diffuse panicle of flowering axes. *Kalbrejera*.
6. Pistil unilocular, uniovulate at anthesis with lateral or basal styles loosely united; floral pits spirally arranged or verticillate; inflorescence spicate to diffusely paniculate. *Geonoma* (incl. *Taenianthera*).

Aristeyera H. E. Moore, gen. nov. [Palmae-Arecoideae-Geonomeae].

Genus *Geonomearum Welfiae* affinis sed folia praeter apicem bifidum indivisa pinnate nervata, inflorescentia spicata bracteis tenuis, florum masculorum staminibus 21-24 antheris in gemma inflexis thecis disjunctis in connectivo bifido, semine rapha indivisa vel furcata instructo.

Solitary, slender, unarmed, monoecious, protandrous undergrowth palms. Leaves entire except for the bifid apex or rarely ruptured but scarcely divided laterally, pinnately nerved; sheath short, at first closed but soon rupturing opposite the petiole, this rounded below, shallowly grooved above, with sharp entire margins. Inflorescences interfoliar, erect, solitary at the nodes, subtended by 2 closely sheathing basally inserted bracts, the lower ancipitous, opening apically, the upper longer, rounded, acute and at first enclosing the spike in bud; peduncle elongate, terminating in a thick undivided spicate flowering axis, the flowers borne in triads of 2 lateral staminate and a central pistillate (or paired or solitary staminate through abortion of the pistillate toward the apex of the axis) sunken in prominent pits, these covered with a prominent bract in bud and arranged in 8 verti-

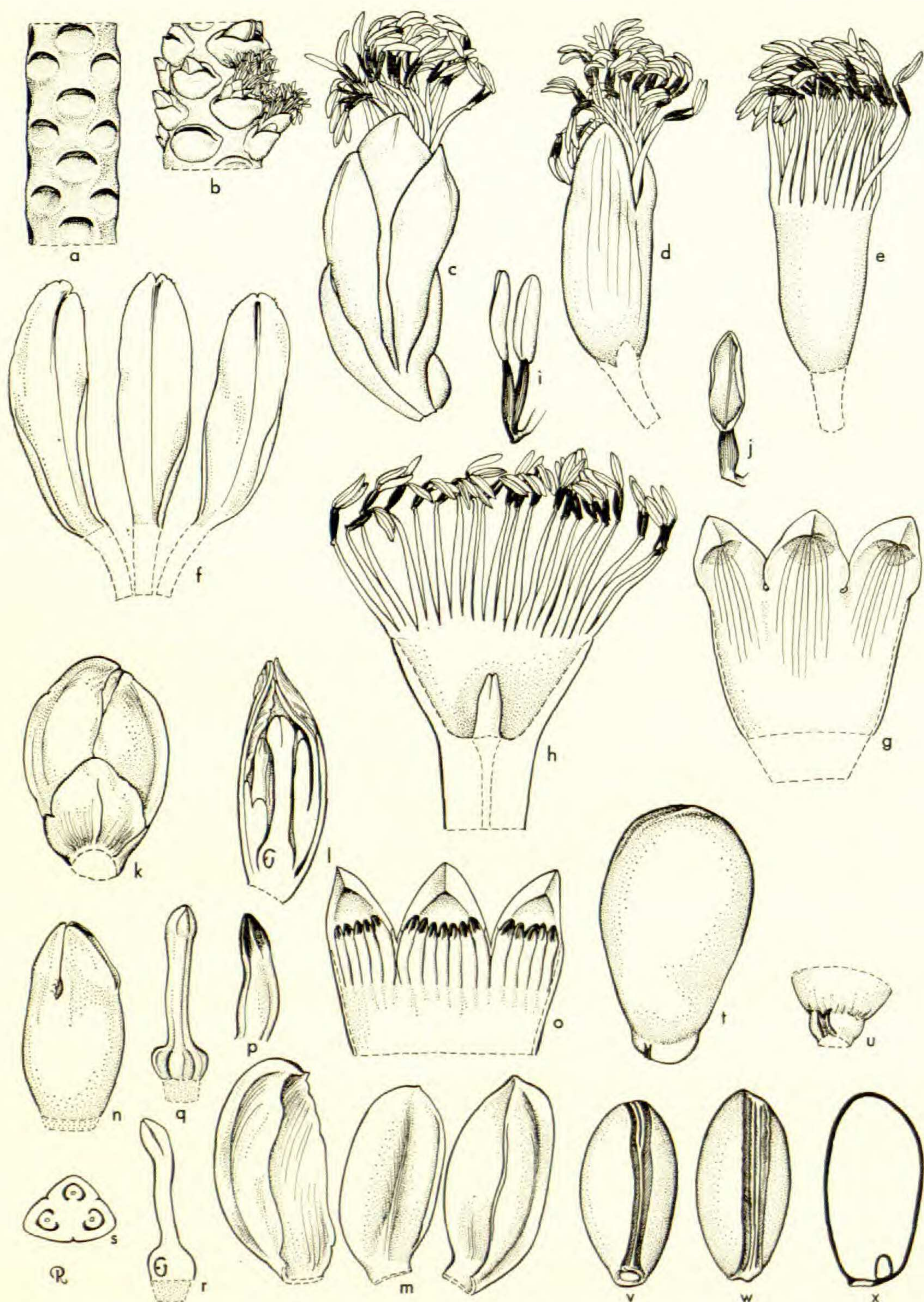


FIGURE 1. *Aristeyera spicata*. a, portion of young spike before anthesis showing bracts covering pits, $\times 1$; b, pits and staminate flowers at anthesis, $\times 1$; c, staminate flower and bracteole, $\times 4$; d, staminate flower with calyx removed, $\times 4$; e, androecium, $\times 4$; f, sepals, $\times 4$; g, corolla expanded, $\times 4$; h, androecium expanded and pistillode, $\times 4$; i, anther, $\times 8$; j, theca and connective, $\times 8$; k, pistillate flower with bracteole in bud, $\times 4$; l, pistillate flower in vertical section, $\times 4$; m, sepals, $\times 4$; n, corolla, $\times 4$; o, corolla expanded and staminodes, $\times 4$; p, staminode, $\times 8$; q, pistil, $\times 4$; r, pistil in vertical section, $\times 4$; s, ovary in cross-section, $\times 8$; t, fruit, $\times 2$; u, base of fruit and stigmatic residue, $\times 2$;

cal rows, bracteoles subtending the flowers 3, anatomically one per flower but in the pit placed so that superficially one appears to subtend one of the staminate flowers and two surround the base of the pistillate flower. Staminate flowers about $1/3$ exserted at anthesis, the 3 sepals distinct above a short attachment to the receptacle, glumaceous, imbricate at least basally in bud; petals 3, connate, sometimes unequally so, for $1/3-3/4$ their length in a soft tube, the free, slightly asymmetric lobes deltoid, glumaceous, valvate above briefly imbricate bases; stamens 21-24, exserted at anthesis, the filaments united with the base of the pistillode and with the corolla-tube about $1/4$ their length in a fleshy solid receptacle, then expanded and connate in a tube about equally long surrounding a fleshy, shallowly and acutely, often irregularly 3-lobed pistillode, the free portions of the filaments only slightly shorter than the connate portions, erect, the anthers inflexed in bud, the thecae separate, longitudinally dehiscent, terminal on arms of a bifid connective, the arms of the connective and thecae becoming erect or nearly so at anthesis. Pistillate sepals 3, glumaceous, distinct, imbricate in bud; petals 3, connate for about $2/3$ their length in a soft fleshy tube, the deltoid free glumaceous lobes valvate in bud, probably spreading at anthesis; staminodes 15-18, connate basally and adnate to the corolla-tube about $1/2$ their length, then free, angled-linear, often with shallow adaxial grooves and sometimes thickened apically, the apices dark and connective-like; pistil trilocular, triovulate, the ovary with 3 rounded lobes; styles terminal, elongate, loosely united; stigmas 3, prominent and probably recurved at anthesis; ovules hemitropous, axile, pendulous, attached near the top of the locule, only one normally maturing. Fruit ellipsoid-ovoid in outline, slightly compressed laterally (in relation to the flower but appearing dorso-ventrally compressed in relation to the axis) and slightly keeled apically when dry, the residual stigmas and abortive carpels basal; exocarp smooth; mesocarp dry with longitudinal fibers closely placed around the endocarp, this thin, crustaceous, shining, not adherent to seed; seed ellipsoid to obovoid and slightly compressed laterally; hilum small, excentrically basal; raphe encircling the seed from hilum to excentrically basal embryo, somewhat impressed and unbranched to furcate or with a few parallel branches; endosperm homogeneous.

TYPE SPECIES: *Aristeyera spicata*.

***Aristeyera spicata* H. E. Moore, sp. nov.**

Caules solitarii ad 8 m. alti. Folia elongato-cuneata petiolo 35-36 cm. longo rachidi 68-70 cm. longa lamina utrinque 27-nervata. Inflorescentia 70-86 cm. longa spica dense fulvo-tomentosa 25-40 cm. longa. Flores masculi 7 mm. longi feminei in gemma 6 mm. longi. Fructus atroruber 12-14 mm. longus 6-7 mm. latus 6 mm. crassus.

Trunk short, 2-8 m. high, to 3.5 cm. in diameter or perhaps more,

v, w, seed in adaxial and abaxial views, $\times 2$; x, seed in vertical section, $\times 2$. All from preserved material: *L. Aristeguieta*, Dec. 28, 1962.

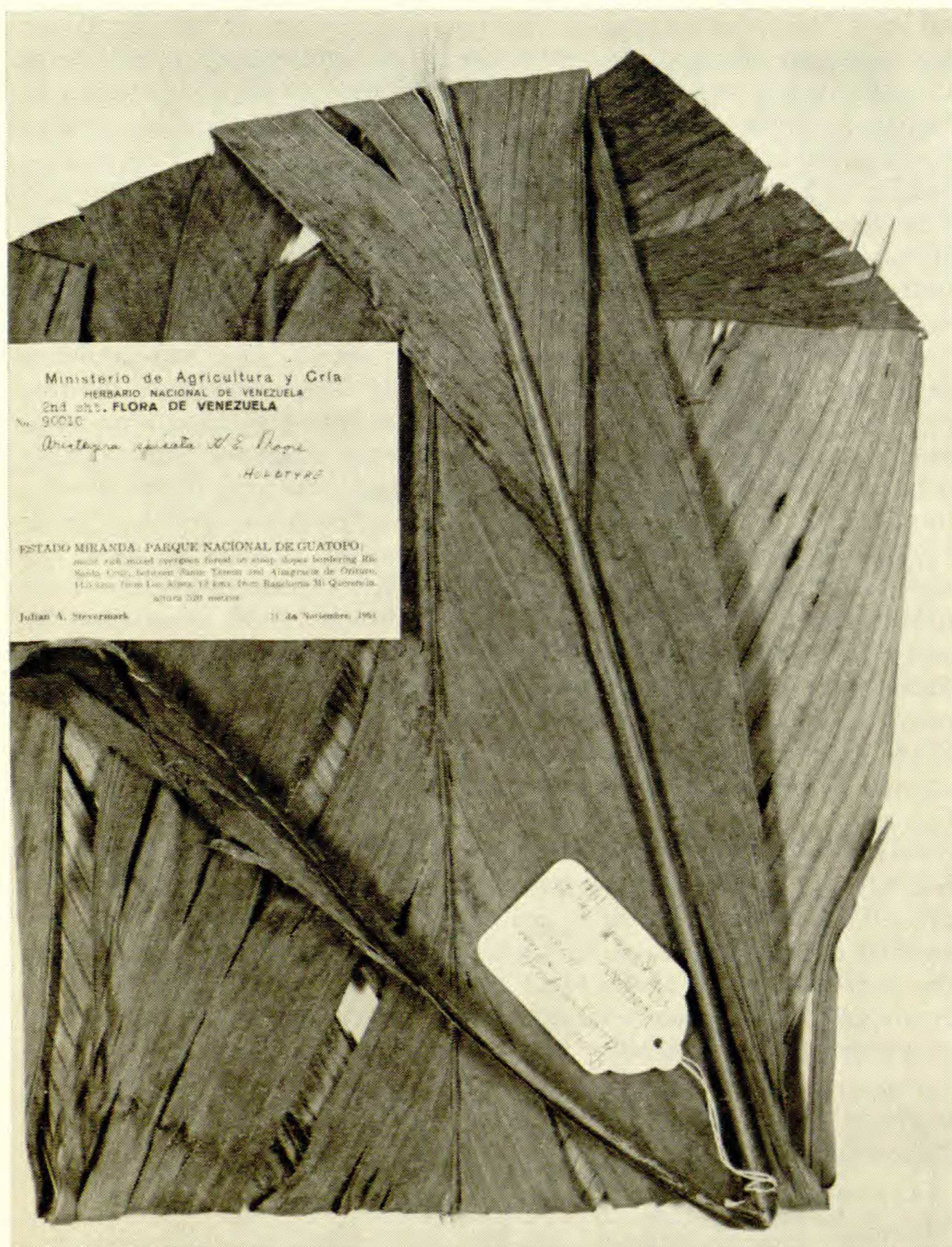


FIGURE 2. *Aristeyera spicata*. Leaf from holotype, \times ca. $\frac{1}{4}$.

rather closely ringed with oblique leaf-scars. Leaves elongate-cuneate in outline, erect, subcoriaceous, deep green above, silvery green below, undivided except for the caudately bifid apex, or the blade sometimes irregularly split but the segments scarcely separated, the rachis terminating in a short filament; sheaths at maturity open to or nearly to the base, frayed into a few stiffish fibers marginally, densely dull red-brown, lepidote-tomentose, ca. 15 cm. long and narrowed to a petiole ca. 36 cm.

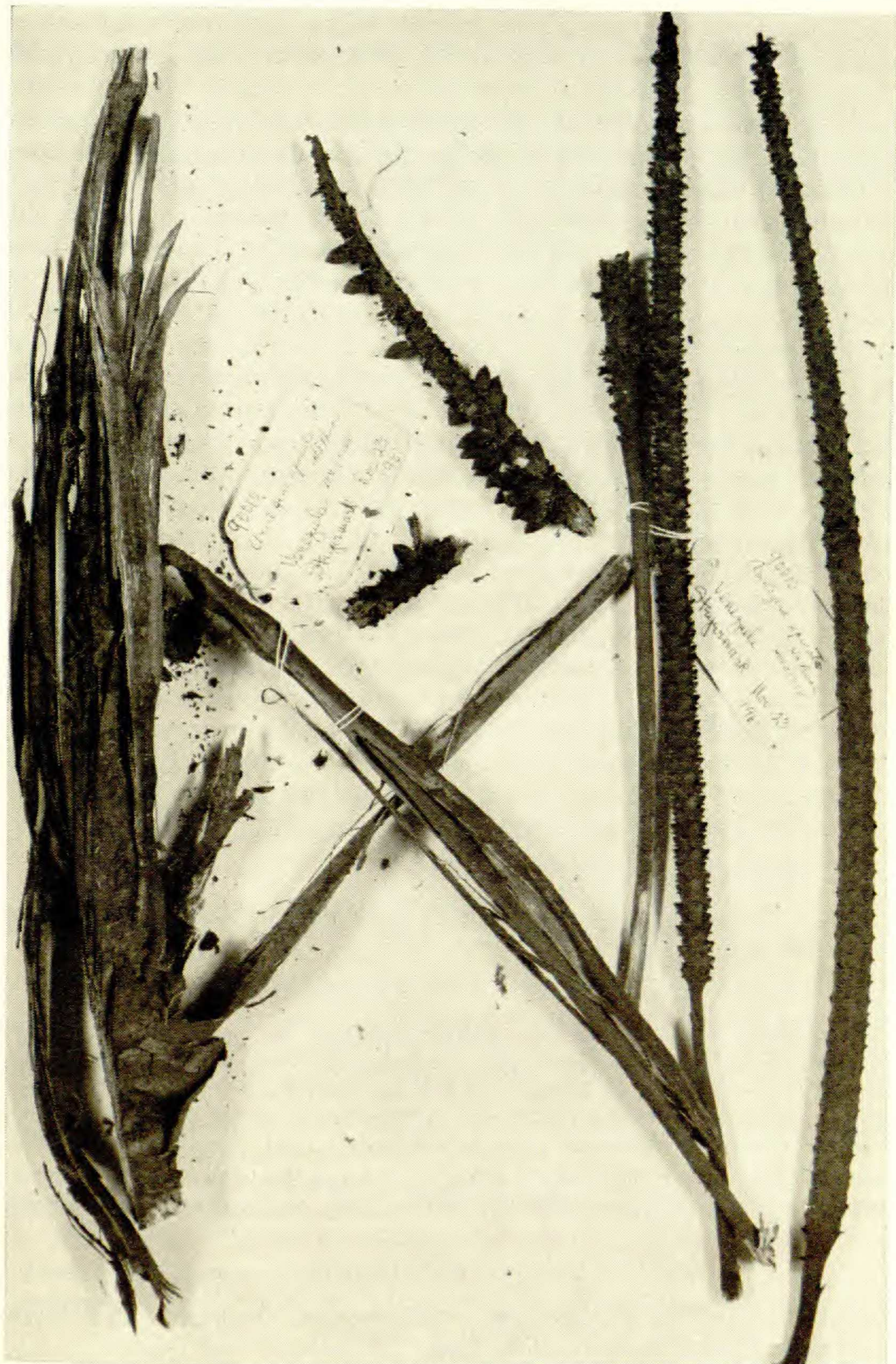


FIGURE 3. *Aristeyera spicata*. Part of stem with base of inflorescence and portions of inflorescences in fruit, at anthesis, and in bud, from holotype, \times ca. $\frac{1}{4}$.

long, this deeply concave above, convex below, dark-brown-lepidote at least laterally below or becoming merely dark-punctulate in age; rachis 6.8–7 dm. long, concave at base above but becoming triangular and elevated toward apex, rounded and brown-lepidote or -punctulate below; blade ca. 30 cm. wide at apex of rachis, the caudate tips 19.5–33 cm. long on the inner margin, nerves ca. 27 per side, not elevated above, yellowish and prominent below when dry, brown scurfy toward base and with scattered brown mostly medifixed membranous scales to 6 mm. or more long on basal half, intermediate secondary nerves 2, tertiary nerves 7 or more, often minutely lepidote, the surface with numerous translucent dots. Inflorescence 70–86 cm. long; lower bract ca. 24 cm. long, upper ca. 39 cm. long, both more or less densely brown-lepidote-tomentose as the sheath; peduncle ca. 46 cm. long, densely fulvous-tawny lepidote-tomentose; spike 25–40 cm. long, densely fulvous-tawny lepidote-tomentose in bud and darker tomentose in fruit, usually narrowed to a sterile spinose tip ca. 2.5 cm. long. Staminate flowers with bracteole ca. 5 mm. high; sepals adnate basally to the receptacle for ca. 0.5 mm., nearly or quite as long as the petals, 6.5–7 mm. long, keeled, entire, and acute to emarginate at apex; petals 7 mm. long, united to receptacle for about 1.5 mm. then connate to $\frac{2}{3}$ their length, the lobes 2.5–3 mm. long; stamen-filaments adnate to receptacle ca. 2 mm., then expanded in a tube ca. 2 mm. long, free filaments to 3 mm. long, connective to 1.5 mm. long, thecae to 1.5 mm. long; pistillode ca. 1 mm. high. Pistillate buds ca. 6 mm. high; sepals strongly keeled and about 6 mm. long, equalling the petals. Fruit dark red, 12–14 mm. long, 6–7 mm. wide, 6 mm. thick; seed 9–10 mm. long, 5 mm. wide, 4–5 mm. thick, 3 mm. across base.

VERNACULAR NAMES: *palma*, *palmito*.

USES: fruit said to be edible, leaves used for durable thatch supposed to last ten years.

DISTRIBUTION: on steep slopes of mixed evergreen forest.

Venezuela. ESTADO MIRANDA: Parque Nacional de Guatopo; moist rich mixed evergreen forest on steep slopes bordering Río Santa Cruz, between Santa Teresa and Altagracia de Orituco, 14.5 kms. from Los Alpes, 12 kms. from Ranchería Mi Querencia, alt. 520 m., 23 Nov. 1961, *J. A. Steyermark* 90010 (BH, holotype; VEN, isotype); carretera Sta. Teresa-Altagracia de Orituco, June 1953, *L. Aristeguieta* 1772 (VEN); selva de Guatopo, June 1958, *L. Aristeguieta* 3185 (VEN); without definite locality, 20 Dec. 1961, *G. Agostini* S. 00010 (VEN).

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